DEPARTMENT OF ENVIRONMENTAL QUALITY
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM

Fact Sheet

Permittee:	Town of Whitehall
Permit No.:	MT0020133
Receiving Water:	Big Pipestone Creek
Facility Information:	
Name	Town of Whitehall Domestic Wastewater Treatment Facility
Location	Township 1N, Range 4W, Section 2, Jefferson County
Facility Contact:	Kory Klapan, Public Works Director P.O. Box 529 Whitehall, MT 59759
Fee Information:	
Type	Minor Publicly Owned Treatment Works
Type of Outfall	001 – Facility Discharge

I. Permit Status

This is a renewal of Montana Pollutant Discharge Elimination System (MPDES) permit MT0020133. The 2009-issued permit became effective March 1, 2009 and expired February 28, 2014. The Montana Department of Environmental Quality (DEQ) received an application and fees from the Town of Whitehall (Whitehall) for renewal of MT0020133 on July 22, 2013. DEQ replied with a notice of deficiency on August 9, 2013 and a final notice of deficiency on April 24, 2014. DEQ received updated application information from the Town on May 12, 2014, deemed the application complete, and the 2009-issued permit was administratively extended (ARM 17.30.1313) in a letter dated May 21, 2014.

II. Facility Information

A. Facility Description

Whitehall Wastewater Treatment Facility (WWTF) is a three-celled facultative lagoon system classified as a minor publicly owned treatment works (POTW). The WWTF was originally built in the late 1950's, upgraded in 1988, and significantly upgraded in 2012 to a system with one primary treatment cell, two secondary storage cells, an irrigation pump, and a center pivot irrigation system for effluent disposal by land application. A schematic of the upgraded facility is included in Figure 1. Average daily design flow is 0.16 million gallons per day (mgd). The cells are lined with a high density polyethylene (HDPE) geomembrane liner with rip rap on slopes, and sized to provide approximately 237 days of total hydraulic detention time. The primary treatment cell has a treatment capacity of 6.7 million gallons (MG) and the storage cells have a storage capacity of 15 MG and 11.9 MG, respectively. The facility can be operated in series or parallel.

Since September 2012, there has been no discharge to Big Pipestone Creek, and treated wastewater is land applied via the center pivot irrigation system. However, the facility is maintaining permit coverage in the case that there is a want or need to discharge effluent to Big Pipestone Creek. Discharge, if necessary, is directed by pumping from lagoon 2 or 3 to outfall 001 into Big Pipestone Creek through a V-notch weir with a staff gage and ultraviolet (UV) light housing. UV disinfection is not used for land application of effluent, but is available during a discharge event. **Table 1** summarizes the current WWTF design criteria.

Table 1: Current Design Criteria Summary

Facility Description: Three-cell facultative lagoon system, total retention/periodic discharge with intermittent land application, UV disinfection.	
Construction Date: late 1950's, operational 1960[(1)]	Modification Date: 1988, 2012
Design Population: 1,038[(2)]	Current Population: 1,100 (2013 application material)
Design Flow, Average (mgd): 0.16[(2)]	Design Flow, Maximum Day (mgd): unknown
Primary Cells: 1	Secondary Cells: 2
Number Aerated Cells: 0	Minimum Detention Time Total System (days): 237[(2)]
Design BOD_5 Removal (%): unknown	Design BOD_5 Load (lb/day): 276[(2)]
Design TSS Removal (%): unknown	Design TSS Load (lb/day): unknown
Collection System Combined [ ] Separate [X]	Estimated I/I: negligible
Sanitary Sewer Overflow (SSO) Events (Y/N): Y July, 2009[(3)]	Bypass Events (Y/N): unknown
Disinfection (Y/N): Y	Type: UV[(4)]

Footnotes:

(1) Great West Engineering, 2006 PER
(2) Great West Engineering, 2011 Whitehall Wastewater Improvements Project Design Memorandum
(3) Administrative Order on Consent Docket No. WQ-10-24
(4) Personal communication with Dale Davis, Mayor, and Kory Klapan, Public Works Director, on Oct. 03, 2016

Wastewater from the gravity flow collection system flows into a lift station and is then pumped to the inlet bypass structure for discharge into the primary treatment cell, and then to the storage cell 2, and finally storage cell 3 if cell 2 has reached capacity. If necessary, the storage cells may be dewatered to the sludge storage depth in the fall for maximum storage during winter months. In the summer months, wastewater is pumped from the storage cells to a center pivot sprinkler system for land-applied irrigation. Some areas of the collections system were constructed in 1915 and others in 1960 with recent upgrades. In 2012, approximately 11,000 feet of gravity sewer main was rehabilitated with approximately 2,610 feet of transmission main abandoned in place. A new package lift station was installed and an 8 inch forcemain was constructed from the lift station to the lagoons. The DEQ August 4, 2016 Lagoon Operation and Maintenance (O&M) Report observes an average flow of 0.06 mgd for a population of approximately 1100, equating to 55 gpcd. Therefore, I/I flows are estimated to be negligible.

A sludge removal project for the abandoned east lagoon was scheduled as part of facility upgrades and was completed by 2013. Actual detention time in the lagoon system may be impacted by sludge build up in the cells. Lagoons 1 (primary treatment), 2 (storage), and 3 (storage) have a maximum sludge depth of 2.0 ft, 1.0 ft, and 1.0 ft, respectively. The August 2016 Lagoon O&M Report recommends sludge levels be checked in 2017 or 2018. Storage and application of sludge, as needed, shall meet requirements of EPA regulations (40 CFR 503).

B. Effluent Characteristics

Effluent characteristic data as reported on discharge monitoring reports (DMRs) for a period of record (POR) from January 2011 through August 2012 are provided in **Table 2**. The Whitehall WWTF has not discharged since August, 2012 when land application of effluent began. Therefore, no self-monitoring effluent data representative of the current upgraded system exist.

Table 2: DMR Effluent Characteristics [(1)] – January 2011 through August 2012

Parameter	Location	Units	2009 Permit Limit	Minimum Value	Maximum Value	Average Value	Number of Records
Flow, Daily Average	Effluent	mgd	[(2)]	0.087	0.104	0.095	15
5-Day Biochemical Oxygen Demand (BOD_5)	Influent	mg/L	[(2)]	8.7	195	132	16
	Effluent	mg/L	45/65[(3)]	1.0	39	14	14
	NA	% removal[(4)]	65	46	100	89	15
	Effluent	lb/day	136/94[(3)]	0.83	31.2	11.0	14
Total Suspended Solids (TSS)	Influent	mg/L	[(2)]	15	158	89	16
	Effluent	mg/L	45/65[(3)]	4.0	40	13	14
	NA	% removal[(4)]	65	66	100	88	15
	Effluent	lb/day	136/94[(3)]	2.9	32.4	10.3	14
Escherichia coli[(4)(5)]	Effluent	cfu/100mL	252/126[(3)]	1.7	296	131	9
Escherichia coli[(4)(6)]	Effluent	cfu/100mL	1,260/630[(3)]	4.3	24200	1578	6
pH	Effluent	s.u.	6.0-9.0	7.5	9.0	7.9	30
Temperature	Effluent	ºC	[(2)]	5.33	25.3	14.6	15
Ammonia, total as N	Effluent	mg/L	[(2)]	0.35	24.7	12.3	15
Total Kjeldahl Nitrogen	Effluent	mg/L	[(2)]	0.683	27.2	16.7	15
Nitrate + Nitrite, as N	Effluent	mg/L	[(2)]	0.003	1.26	0.32	14
Total Nitrogen as N	Effluent	mg/L	[(2)]	0.807	27.3	17.0	15
		lb/day	[(2)]	0.693	22.0	13.3	15
		mg/L	[(2)]	8.01[(7)]	22.0[(7)]	14.4[(7)]	4[(7)]
Total Phosphorus as P	Effluent	mg/L	[(2)]	0.166	5.21	2.75	15
		lb/day	[(2)]	0.143	4.21	2.14	15
		mg/L	[(2)]	1.18[(7)]	5.21[(7)]	3.06[(7)]	4[(7)]
Oil and Grease	Effluent	mg/L	[(2)]	1.0	5.6	2.57	10
Arsenic, total recoverable[(8)]	Effluent	µg/L	NA	5	5	5	1

Footnotes: ND = Not Detected, NA = Not Available, Data reported as ND is assumed to be the reporting limit.

(1) Statistical values based on individual values reported on DMRs when available. Average or maximum reported values used when no others available.
(2) No limit in 2009 permit; monitoring requirement only.
(3) Average Weekly Limit/Average Monthly Limit.
(4) Geometric average.
(5) Sample period is April 1 to October 31.
(6) Sample period is November 1 through March 31.
(7) Sample period is July 1 to September 30.
(8) Sample collected October 16, 2009; sourced from *Town of Whitehall Land Application Evaluation and Irrigation Plan for Treated Municipal Wastewater Effluent*

Compliance History

DEQ performed two MPDES compliance inspections between 2009 and 2016 (July 23, 2010 and March 14, 2014). The 2010 inspection took place prior to any upgrades, and the 2014 inspection took place after some upgrades, but before all upgrades were complete.

Several numeric limit exceedances were documented for the period of April, 2008 through the inspection date, July 23, 2010:

- Six for Total Suspended Solids (TSS) in 2008, 2009, and 2010
- Three for Biochemical Oxygen Demand (BOD_5) in 2010
- Three for pH in 2009
- Six for *Escherichia coli* (*E. coli*) in 2009 and 2010

The 2010 compliance inspection report notes that exceedances of BOD_5 and TSS coincide with spring turnover, pH exceedances are a result of improper use of a newly purchased meter, and *E. coli* exceedances are the result of turning off the UV disinfection system during March 2009 and December 2009 through April 2010.

Additional items of noncompliance documented in the 2010 compliance inspection were:

- Failures to complete sample analysis and report accurate results within the required timeframes
- Failure to maintain records of sampling equipment calibration
- Failure to report incidents of noncompliance which may seriously endanger health and the environment (SSO event)

A SSO occurred in July 2009 when approximately five gallons of sewage overflowed at the clean out area of a service line for an A&W restaurant.

At the time of the March 14, 2014 inspection, the WWTF was not discharging and consisted of the contemporary three-celled synthetic lined lagoon system with a UV system east of the third cell, but lacking electricity or plumbing to the system. A bypass system leading to the UV system was in place. The land application pivot system was complete and operational. Documented violations were:

- Failure to calibrate pH meter before each use, failure to maintain a pH calibration log, and failure to have current pH standards
- Failure to report effluent monitoring results on a DMR Form

The permittee entered into an Administrative Order on Consent (AOC), Docket No. WQ-10-24, with DEQ on January 13, 2011 to address violations due to exceedance of permit effluent limits and DMR violations. The compliance plan included treatment and storage wastewater improvements, collection system improvements such as sewer main lining, irrigation system implementation, and land application of municipal sludge from the abandoned east lagoon. In a letter dated February 2, 2016, DEQ acknowledged the permittee fulfilled all the requirements of the AOC and that the enforcement case would be closed.

III. Technology-based Effluent Limits

Federal regulations (40 (Code of Federal Regulations) CFR 133) define minimum requirements for secondary treatment, or the equivalent, for POTWs (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by pH, 5-Day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), and percent removal of BOD_5 and TSS.

The proposed technology-based effluent limits (TBELs) found in **Table 3** are based on national secondary treatment standards (NSS) and treatment equivalent to secondary (TES). Federal regulations allow for the application of TES effluent limits for BOD_5 and TSS, or Alternative State Requirements (ASR) for TSS to facilities that meet specific criteria 40 CFR 133.105.

The 2009-issued permit effluent limits were set at TES for BOD_5 and TSS (65 mg/L average weekly, and 45 mg/L average monthly) with 65 percent removal year round for both parameters. Whitehall WWTF has been updated significantly since previous permit TBELs were established. The facility has been modified from a two-celled facultative lagoon system with continuous discharge to a three-celled facultative lagoon system designed for total retention and land application of effluent. DEQ finds that the new facultative lagoon system should consistently achieve NSS for BOD_5 (45 mg/L average weekly, and 30 mg/L average monthly) and TES for TSS, with 85% removal of BOD_5 and 65% removal of TSS.

Effluent limits must be expressed in terms of mass (mass/time), except for certain conditions, such as pH or temperature (ARM 17.30.1345) [40 CFR 122.45(f)(1)]. For municipal treatment plants, mass-based limits are based on average daily design flow for the facility.

The mass-based limits for the Town of Whitehall WWTF are calculated as follows:

Load (lbs/day) = Design Flow (mgd) x Concentration (mg/L) x 8.34 (lb·L)/(mg·gal)

BOD_5 mass-based limitation:
Average Weekly = 0.16 mgd x 45 mg/L x 8.34 (lb·L)/(mg·gal) = 60 lb/day
Average Monthly = 0.16 mgd x 30 mg/L x 8.34 (lb·L)/(mg·gal) = 40 lb/day

TSS mass-based limitation:
Average Weekly = 0.16 mgd x 65 mg/L x 8.34 (lb·L)/(mg·gal) = 87 lb/day
Average Monthly = 0.16 mgd x 45 mg/L x 8.34 (lb·L)/(mg·gal) = 60 lb/day

Table 3: Town of Whitehall WWTF Outfall 001 Proposed TBELs

Parameter	Units	Average Monthly Limit	Average Weekly Limit	Rationale
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	40 CFR 133.102(a)
	lb/day	40	60	
	% removal	85(1)	NA	
Total Suspended Solids (TSS)	mg/L	45	65	40 CFR 133.105(b)
	lb/day	60	87	
	% removal	65(2)	NA	
pH	s.u.	6.0-9.0 (instantaneous)		40 CFR 133.102(c)

Footnotes:

(1) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (85% removal).

(2) The arithmetic mean of the values for effluent samples collected in a period of 30 consecutive days shall not exceed 15% of the arithmetic mean of the values for influent samples collected at approximately the same time during the same period (65% removal).

B. Nondegradation

Nondegradation load allocations calculated in the 2009-issued permit are given in **Table 4** for BOD_5 and TSS. Actual BOD_5 and TSS discharge loads from self-monitoring data were calculated and compared to the nondegradation loads in **Table 4**. These allocations define baseline allocated loads for the WWTF and any increase above this amount is subject to the provisions of Montana's Nondegradation Policy 75-5-303, Montana Code Annotated (MCA) and Administrative Rules of Montana (ARM) 17.30.705, *et seq*. The permit does not authorize a new or increased discharge.

In the 2009-issued Permit's Statement of Basis (SOB), DEQ continued the mass-based load allocations for BOD_5, TSS, total nitrogen (TN) and total phosphorus (TP) that were originally developed in the 1996 permit renewal. However, DEQ finds the TN and TP nondegradation allocated loads are not applicable since these loads were calculated using the Department of Health and Environmental Sciences (DHES) memorandum (DHES, 1994). These calculated allocated loads were not based on either the criteria in ARM 17.30.715 or on the water quality standards in Circular DEQ-7 (DEQ, 2012). Therefore, the TN and TP load allocations are not included in this permit renewal. Removing the TN and TP nondegradation allocations will not cause a decline in water quality since these parameters are reviewed under the Water Quality-based Effluent Limit (WQBEL) section and appropriate limits developed if needed.

Table 4: Calculated Nondegradation Allocated and Actual Annual Loads							
Parameter	**Allocated Load(1) (lb/day)**	**Actual 30-Day Average Loads (lb/day)**					
		2011	2012 (Jan 1 – Aug 31)(2)	2013(2)	2014(2)	2015(2)	2016(2)
5-Day Biochemical Oxygen Demand (BOD_5)	94	11.1	10.9	--	--	--	--
Total Suspended Solids (TSS)	94	9.5	11.6	--	--	--	--

Footnotes:

(1) Original allocated loads from SOB dated October 31, 2008.
(2) No data available; facility discontinued discharging and began land application of effluent in September, 2012.

Loading limits for the technology-based parameters of concern will be maintained at the more stringent values of either nondegradation allocations or mass-based loading limits, and will apply to the effluent.

IV. Water Quality-based Effluent Limits (WQBELs)

A. Scope and Authority

Permits are required to include water quality-based effluent limits (WQBELs) when TBELs are not adequate to protect state water quality standards (40 CFR 122.44 and ARM 17.30.1344). Montana water quality standards require that no wastes may be discharged that can reasonably be expected to violate any state water quality standards (ARM 17.30.637(2)). Montana water quality standards also define both water use classifications for all state waters and numeric and narrative standards that protect those designated uses (ARM 17.30.601, *et seq*.).

B. Receiving Water

Wastewater is discharged from Outfall 001 to Big Pipestone Creek within a mile of the confluence with Jefferson Slough, associated with the Jefferson River, according to data available in Montana's Clean Water Act Information Center. Big Pipestone Creek is located within the Jefferson River watershed as identified by the U.S. Geological Survey (USGS) Hydrological Unit Code (HUC) 10020005 and Montana Assessment Unit MT41G002_010. The receiving water is classified as B-1**.** Waters classified B-1 are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply. Brook trout, rainbow trout, and brown trout are present year round in Big Pipestone Creek, based on 2011 fishing logs and additional information available on MT Fish, Wildlife, and Parks (FWP) Montana Fisheries Information System (MFISH) database.

The Big Pipestone Creek assessment unit to which the facility discharges is listed as impaired in DEQ's Draft 2016 and the Final 2014 *Water Quality Integrated Reports* (Clean Water Act Information Center, CWAIC). This assessment unit does not fully support aquatic life, primary contact recreation, or drinking water uses due to the following probable causes:

physical substrate habitat alterations and alteration in stream-side or littoral vegetative covers, arsenic, nitrogen, phosphorous, sedimentation/siltation, temperature, and TSS. The 2014 and Draft 2016 assessment summaries for this stream segment specifically associate municipal point sources with impairment for TN, TP, water temperature, and TSS. The probable source of arsenic is unknown.

DEQ has completed sediment and arsenic Total Maximum Daily Loads (TMDL) for Big Pipestone Creek. The Whitehall WWTF arsenic wasteload allocation established by the 2014 *Jefferson River Metals Project Area TMDLs and Water Quality Improvement Plan* is 0.021 lb/day as a monthly average, calculated from the previous WWTF design flow of 0.251 mgd. This value is based on achieving the arsenic human health standard (10 µg/L). The Whitehall WWTF TSS wasteload allocation established by the 2009 *Upper Jefferson River Tributary Sediment TMDLs and Framework Water Quality Improvement Plan* is 17.1 tons/year or 94 lb/day, equivalent to the average monthly TBEL of the 2009-issued permit. Big Pipestone Creek is currently on the 303(d) list due to nutrients (TN and TP) and temperature.

Critical flow values were developed by DEQ. Flow data collected between 2004 and 2013 were analyzed for low flow statistics and compared to three other similar streams in Montana. Except for TN and TP, the critical upstream flow value is the 7-day average expected to occur every 10 years (7Q10), estimated to be 5.6 cubic feet per second (cfs), which is equivalent to 3.6 mgd. DEQ uses the seasonal 14-day average expected to occur every five years (14Q5) for TN and TP. The proxy seasonal 14Q5 (July – October) used for the purposes of this permit renewal is 7.8 cfs, which is equivalent to 5.0 mgd.

Ambient Water Quality Data

Table 5 provides a summary of the ambient water quality data used in assessing Reasonable Potential (RP) to exceed the water quality standards in Big Pipestone Creek, and to develop any necessary effluent limits designed to protect these standards.

The most conservative numeric value, the limit under which the sample was not quantified, was used for nondetect records. Twelve upstream samples were reported nondetect for ammonia below the reporting limit of 0.05 mg/L; DEQ will assume the ammonia concentration of these samples is the reporting limit. Two upstream ammonia samples were reported nondetect for ammonia below the method detection limit of 0.014 mg/L; DEQ will assume the ammonia concentration of these samples is the method detection limit. Two upstream samples for nitrate + nitrite were reported non-detect, one below the method detection limit of 0.003 mg/L, and one below the reporting limit of 0.01 mg/L. DEQ will assume the nitrate + nitrite concentration of these samples is 0.003 mg/L and 0.01 mg/L, respectively.

All ambient water quality data was collected by Whitehall at a location upstream of the influence of Outfall 001 and downstream of any tributary or irrigation return flow. Total recoverable arsenic ambient data was obtained from DEQ monitoring sites MDEQ_WQ_WQX-M08BGPSC04, approximately 1.5 miles upstream of the WWTF, and MDEQ_WQ_WQX-M08BGPSC03, near the confluence with Jefferson Slough, downstream of the WWTF beyond the mixing zone established in the 2009-issued permit.

Table 5. Big Pipestone Creek Ambient Water Quality Data for January 2012 – September 2016

Parameter	Units	75th Percentile(1)	Number of Samples	Monitoring Data Source
pH	s.u.	8.04(2)	38	Whitehall WWTF
Temperature	°C	16.0	30	Whitehall WWTF
Ammonia, total as N	mg/L	0.40(3)	56	Whitehall WWTF
Nitrate + Nitrite as N	mg/L	0.24	25	Whitehall WWTF
Total Nitrogen as N (summer)	mg/L	1.70	11(4)	Whitehall WWTF
Total Phosphorus a P (summer)	mg/L	0.182	11(5)	Whitehall WWTF
Arsenic, total recoverable	µg/L	11(6)	3	MDEQ_WQ_WQX - Montana DEQ WQPB

Footnote:
(1) 75th percentile determined using rank calculated as $x = p(N+1)$, where x=rank, p=percent rank, N=sample size
(2) Mean; used because number of samples is >30
(3) 95% upper confidence limit of the mean; used because number of samples is >30.
(4) The 75th percentile of TN results for 11 samples during the summer months of July-September was 1.70 mg/L. The 75th percentile of 37 samples January – December was 1.65 mg/L.
(5) The 75th percentile of TP results for 11 samples during summer months of July-September was 0.182 mg/L. The 75th percentile of 37samples January – December was 0.168 mg/L.
(6) Samples collected October, 2012 – May, 2013.

C. Applicable Water Quality Standards

Discharges to surface waters classified B-1 are subject to the specific water quality standards of ARM 17.30.623, Department Circulars DEQ-7 (Numeric Water Quality Standards) and 12A (Base Numeric Nutrient Standards), and the general provisions of ARM 17.30.635 through 637. In addition to these standards, dischargers are subject to ARM 17.30 Subchapter 5 (Mixing Zones) and Subchapter 7 (Nondegradation).

D. Mixing Zone

A mixing zone is an area where effluent mixes with the receiving water and certain water quality standards may be exceeded. Mixing zones must have the smallest practicable size, a minimum practicable effect on water uses, and definable boundaries. DEQ will determine the appropriateness of a mixing zone and will grant a mixing zone, deny the mixing zone, or grant an alternative or modified mixing zone. Rules governing the granting of mixing zones are found in Montana Code Annotated (MCA) 75-5-301 and in ARM 17.30.501 *et seq*.

Mixing zones allowed under a permit issued prior to April 29, 1993, will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses. A standard mixing zone may be granted for facilities which discharge less than 1 mgd, however, mixing zones are granted on a parameter-by-parameter basis. No

mixing zone will be granted that will impair beneficial uses. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of the mixing zone. Facilities that discharge a mean annual flow of less than 1 mgd to a stream segment with a dilution ratio less than 100:1 qualify for a standard mixing zone with 25% of the 7Q10 for chronic aquatic life and human health standards. A standard mixing zone with 25% dilution addresses only chronic aquatic life standards. Acute standards for aquatic life may not be exceeded in the mixing zone, unless DEQ finds that allowing minimal dilution will not threaten or impair existing beneficial uses. Dilution with 2.5% of the 7Q10 will be allowed for the acute ammonia aquatic life standard. DEQ finds this appropriate in the case of Whitehall WWTF, as discharge is not planned, and any planned discharge will be infrequent and for short intervals.

The dilution ratio for Whitehall WWTF is calculated as:
7Q10 : average daily design flow of the facility
3.6 mgd (7Q10): 0.16 mgd
= 22.5:1

The length of a standard mixing zone, with non-instantaneous mixing, must not extend downstream more than the one-half mixing width distance or more than ten times the stream width, whichever is more restrictive [ARM 17.30.516(4)]. In the 1997 USGS mixing zone study, *Effluent Mixing Characteristics below Four Wastewater-Treatment Facilities in Southwestern Montana, 1997*, the one-half mixing width distance was calculated to be 46 feet at stream flows approximating the 7Q10 for the purpose of the study. The standard mixing zone of 10 times the stream width is 95 feet in length. Therefore, the standard mixing zone length will be the more restrictive 46 feet downstream from the point of discharge. The chronic mixing zone dimensions will be 46 feet in length and the average stream width of 9.5 feet in width. The acute mixing zone dimensions will be 10% of the chronic mixing zone dimensions; equivalent to 4.6 feet in length, and 1 foot in width.

Reasonable potential analysis and discharge limits will be based on a standard mixing zone allowance of dilution with 25% of the 7Q10 for ammonia using aquatic life standards, and nitrate + nitrite and arsenic using human health standards [17.30.516(3)(b)]. Reasonable potential and discharge limitations for nutrients (TN and TP) will be based on dilution with 100% of the 14Q5, as specified in Circular DEQ-12A.

E. Basis for Water Quality-Based Effluent Limits (WQBELs)

MPDES permit limitations must control all pollutants which will cause, or have RP to cause or contribute to an excursion above any state water quality standard, including narrative criteria. Parameters typically present in municipal wastewater that may cause or contribute to a violation of water quality standards include: conventional pollutants such as biological material (as measured by BOD_5), TSS, pH, oil & grease, and pathogenic bacteria, and non-conventional pollutants such as nitrate + nitrite, nutrients, total ammonia, and metals.

DEQ uses a mass balance equation (see *Equation 1*and *Equation 2*) to determine RP and develop WQBELs, based on *EPA's Technical Support Document for Water Quality-based Toxics Control, March 1991* (TSD), EPA/505/2-90-001.

$$C_r = \frac{C_d Q_d + C_s Q_s}{Q_d + Q_s} \qquad \textit{(Equation 1)}$$

Given:

C_r = the resulting receiving water concentration
Q_d = critical discharge rate (POTW average daily design flow)
Q_s = instream flow available for dilution (critical low flow x available % for dilution)
C_d = critical effluent pollutant concentration (maximum discharge concentration x TSD multiplier)
C_s = critical upstream ambient pollutant concentration (75^{th} percentile concentration, or 95% upper confidence limit of the mean)

RP for the WWTF discharge to cause exceedances of water quality standards for Big Pipestone Creek is evaluated using *Equation 1*, and presented in **Attachment A**. The critical effluent concentration (C_d) is obtained following the method recommended by the EPA's TSD. A multiplier is determined using TSD methods, based on the dataset statistics.

WQBELs must be developed for any parameter for which there is RP to cause or contribute to exceedances of instream numeric or narrative water quality standards. To establish WQBELs for an existing discharger DEQ first calculates wasteload allocations (WLAs). As shown in *Equation 2*, the mass-balance equation can be arranged to calculate the WLA (C_{WLA}) so that the discharge does not cause or contribute to an exceedance of the applicable water quality standard under critical conditions.

$$C_{WLA} = \frac{Q_r C_r + Q_s C_s}{Q_d} \qquad \textit{(Equation 2)}$$

Given:

C_{WLA} = calculated wasteload allocation necessary to achieve instream water quality standard
Q_d = critical discharge rate (POTW average daily design flow)
$Q_r = Q_d + Q_s$
C_r = water quality standard
Q_s = instream flow available for dilution (critical low flow x available % for dilution)
C_s = critical upstream ambient pollutant concentration (75^{th} percentile concentration, or 95% upper confidence limit of the mean)

The WLAs are then translated into average monthly limitations (AMLs) and maximum daily limitations (MDLs) using TSD multipliers. Calculations are presented in **Attachment B**.

The following subsections discuss the basis for the RP and WQBELs in this permit.

1. Conventional Pollutants

BOD_5, TSS, and pH: These parameters are typical effluent quality indicators for municipal wastewater treatment facilities and are regulated as TBELs (see section III of this Fact

Sheet). The TSS WLA calculated in the 2009 *Upper Jefferson River Tributary Sediment TMDLs and Framework Water Quality Improvement Plan* as 17.1 tons/year or 94 lb/day, equivalent to the average monthly mass-based limit of the 2009-issued permit. The TSS TBEL established in this permit renewal is more conservative, at 40 lb/day as an average monthly limit and 60 lb/day as an average weekly limit. The facility provides a significant amount of control for biological material, solids, and pH through secondary treatment meeting NSS and TES, and no additional limits are necessary for these parameters.

Oil and Grease: Montana regulations require state waters be free from substances attributable to municipal discharges that will result in concentrations of oil and grease at or in excess of 10 mg/L. The 2009-issued permit included an oil and grease quarterly monitoring requirement. Semiannual oil and grease monitoring will also be required in the proposed permit (see section VI of this Fact Sheet).

Reasonable potential for the WWTF discharge to cause exceedances of the oil and grease water quality standards for Big Pipestone Creek were evaluated using the following values in *Equation 1*, and presented in **Attachment A**.

Given:
Q_d = 0.16 mgd average daily design flow
Q_s = 0 mgd (7Q10 x available chronic dilution of 0%)
C_d = 9.5 mg/L (maximum observed (5.6 mg/L) x TSD multiplier (1.7))
C_s = 0 mg/L
Calculated Result:
C_r = 9.5 mg/L oil and grease

Using the above calculated critical effluent concentration (C_d) and receiving water concentration (C_s), average daily design flow (Q_d) and low flow rate based on 0% of the 7Q10 (Q_s) in *Equation 1*, the resulting downstream pollutant concentration (C_r) is calculated as 9.5 mg/L. C_r is less than the water quality standard, therefore DEQ finds that the WWTF does not have RP to exceed the oil and grease standard and no effluent limit is required (see **Attachment A**).

Escherichia coli (*E. coli*) **Bacteria:** Pathogens are known municipal wastewater contaminants. The average monthly and average weekly *E. coli* limits will be maintained at the standards in the 2009-issued permit. The State has promulgated *E. coli* standards to protect the beneficial uses of receiving waters from pathogens. The standards for B-1 classified waters from [17.30.623(2)(a)] are:

> April 1 through October 31 of each year – the geometric mean number of *E. coli* must not exceed 126 cfu per 100 mL and 10% of the total samples may not exceed 252 cfu per 100 mL during any 30-day period; and
>
> November 1 through March 31 of each year – the geometric mean number of *E. coli* must not exceed 630 cfu per 100 mL and 10% of the total samples may not exceed 1,260 cfu per 100 mL during any 30-day period.

These standards will be included in the proposed permit average monthly and average weekly limits along with regular monitoring (see section VI of this Fact Sheet).

2. Non-conventional Pollutants

Total Ammonia as N: Circular DEQ-7 includes ammonia aquatic life standards based on pH and temperature of the receiving stream, the presence or absence of salmonid fish species, and the presence or absence of fish in early life stages. DEQ reviewed upstream data in order to evaluate the ambient year round pH and temperature of the river (see **Table 6**). Big Pipestone Creek in the vicinity of the Whitehall WWTF discharge is classified as B-1 water, which is suitable for growth and propagation of salmonid fishes.

Table 6 summarizes the development of the ammonia water quality standards for Big Pipestone Creek in this area:

Table 6: Total Ammonia-Nitrogen Water Quality Standards for Big Pipestone Creek

Condition	Period	Salmonids Present	Early Life Stages	Ambient Conditions		Water Quality Standard (mg/L)[3]
				pH[1] (s.u.)	Temperature[2] (°C)	
Acute Criterion	Annual	Yes	NA	8.04	NA	5.21
Chronic Criterion	Annual	NA	Yes	8.04	16	2.08

Footnotes: NA – Not Applicable

(1) Based on the mean of pH data (n=38, January 2012 - September 2016).
(2) Based on the 75th percentile of temperature data (n=30, January 2012 - September 2016).
(3) Acute and chronic aquatic life standards based on Department Circular DEQ-7 (August, 2012)

Reasonable potential for the WWTF discharge to cause exceedances of the ammonia water quality standards for Big Pipestone Creek were evaluated using the following values in *Equation 1*, and presented in **Attachment A**.

Given:

Q_d = 0.16 mgd average daily design flow
Q_s = 0.90 mgd (7Q10 x available chronic dilution of 25%)
C_d = 37 mg/L (maximum observed (24.7 mg/L) x TSD multiplier (1.5))
C_s = 0.40 mg/L (95% upper confidence limit of upstream data as described below)

Calculated Result:

C_r = 6 mg/L ammonia

Using the above calculated critical effluent concentration (C_d) and receiving water concentration (C_s), average daily design flow (Q_d) and low flow rate based on 25% of the 7Q10 (Q_s) in *Equation 1*, the resulting downstream pollutant concentration (C_r) is calculated as 6 mg/L. C_r is greater than both the acute and chronic ammonia standards developed in **Table 6**, therefore DEQ finds that the WWTF has RP to exceed the ammonia standards and a WQBEL is required (see **Attachment A**).

Wasteload allocations (C_{WLA}) were calculated using the following values in *Equation 2,* so that the discharge does not cause or contribute to an exceedance of applicable water quality standards (acute and chronic aquatic life standards) under critical conditions (see **Attachment B**).

Given:

Q_d = 0.16 mgd average daily design flow
$Q_{s\ acute}$ = 0.09 mgd (7Q10 x available acute dilution of 2.5%)
$Q_{s\ chronic}$ = 0.90 mgd (7Q10 x available chronic dilution of 25%)
$Q_{r\ acute}$ = 0.25 mgd
$Q_{r\ chronic}$ = 1.06 mgd
C_s = 0.40 mg/L
$C_{r\ acute}$ = 5.21 mg/L (water quality standard)
$C_{r\ chronic}$ = 2.08 mg/L (water quality standard)

Calculated Results:

$C_{WLA\ acute}$ = 2.54 mg/L ammonia
$C_{WLA\ chronic}$ = 9.0 mg/L ammonia

The WLAs were then translated into a minimum long-term average, and then a maximum daily limitation (MDL) and average monthly limitation (AML) using TSD multipliers. Proposed ammonia limits are 3.9 mg/L AML and 7.9 mg/L MDL. Calculations of AML and MDL based on TSD method are presented in **Attachment B**.

Nitrate plus Nitrite (N+N): Nitrate and nitrite are toxic components of total nitrogen, which is a common constituent of municipal wastewater. The applicable water quality standard for N+N is the human health standard (HHS), 10 mg/L. WQBELs for N+N were not established in the 2009-issued permit, but monthly monitoring was required. The effluent dataset for N+N for the POR contains 14 quantified values.

Reasonable potential for the WWTF discharge to cause exceedances of the N+N water quality standards for Big Pipestone Creek were evaluated using the following values in *Equation 1*, and presented in **Attachment A**.

Given:

Q_d = 0.16 mgd average daily design flow
Q_s = 0.90 mgd (7Q10 x available chronic dilution of 25%)
C_d = 2.7 mg/L (maximum observed (1.26 mg/L) x TSD multiplier (2.1))
C_s = 0.24 mg/L

Calculated Result:

C_r = 0.61 mg/L N+N

Using the above calculated critical effluent concentration (C_d) and receiving water concentration (C_s), average daily design flow (Q_d) and low flow rate based on 25% of the 7Q10 (Q_s) in *Equation 1,* the resulting downstream pollutant concentration (C_r) is calculated as 0.61 mg/L. C_r is less than the HHS, therefore DEQ finds that the WWTF does not have RP to exceed the N+N standard and no effluent limit is required (see **Attachment A**).

Total Nitrogen: Total nitrogen (TN) is a nutrient which can lead to excessive algal and aquatic vegetation growth and is a common constituent of municipal wastewater. From Table 12A-1 for wadeable streams, The Department Circular DEQ-12A base numeric nutrient standard for TN in Big Pipestone Creek is 0.300 mg/L (Level III ecoregion 17 – Middle Rockies, applied only July 1 – September 30). The seasonal (July 1 – September 30) effluent data set for TN for the POR contains four quantified values.

Reasonable potential for the WWTF discharge to cause exceedances of the seasonal TN water quality standard for Big Pipestone Creek was evaluated using the following values in *Equation 1*, and presented in **Attachment A**.

Given:
Q_d = 0.16 mgd average daily design flow
Q_s = 5.0 mgd (seasonal 14Q5 x available dilution of 100%)
C_d = 57 mg/L (maximum observed (22.0 mg/L) x TSD multiplier (2.6))
C_s = 1.70 mg/L
Calculated Result:
C_r = 3.4 mg/L TN

Using the above calculated critical effluent concentration (C_d) and receiving water concentration (C_s), average daily design flow (Q_d) and low flow rate based on 100% of the seasonal 14Q5 (Q_s) in *Equation 1*, the resulting downstream pollutant concentration (C_r) is calculated as 3.4 mg/L. C_r is greater than the applicable water quality standard, therefore DEQ finds that the WWTF has RP to exceed the TN standard and a WQBEL is required (see **Attachment A**). Seasonal monthly effluent monitoring will be required in the proposed permit (see section VI of this Fact Sheet).

A WLA (C_{WLA}) was calculated using the following values in *Equation 2* so that the discharge does not cause or contribute to an exceedance of applicable water quality standard (base numeric nutrient standard) under critical conditions. Because the critical receiving water concentration (C_s) is greater than the water quality standard, the WLA is set at the water quality standard (0.300 mg/L) at the end-of-pipe.

Given:
C_s = 1.70 mg/L
C_r = 0.300 mg/L (water quality standard)
Calculated Result:
C_{WLA} = 0.300 mg/L TN

The WLA is then translated into an AML based on the end-of-pipe WLA equal to the water quality standard. Total nutrient WQBELs do not require a MDL. The AML is also set at 0.300 mg/L TN. The calculation of the proposed TN limit of 0.300 mg/L AML based on TSD method is presented in **Attachment B**.

Total Phosphorus: Total phosphorus (TP) is a nutrient which can lead to excessive algal and aquatic vegetation growth and is common constituent of municipal wastewater. From Table 12A-1 for wadeable streams, The Department Circular DEQ-12A base numeric nutrient

standard for TP in Big Pipestone Creek is 0.030 mg/L (Level III ecoregion 17 – Middle Rockies, applied only July 1 – September 30). The seasonal (July 1 – September 30) effluent data set for TP for the POR contains 4 quantified values.

Reasonable potential for the WWTF discharge to cause exceedances of the seasonal TP water quality standard for Big Pipestone Creek was evaluated using the following values in *Equation 1*, and presented in **Attachment A**.

Given:
Q_d = 0.16 mgd average daily design flow
Q_s = 5.0 mgd (seasonal 14Q5 x available dilution of 100%)
C_d = 13 mg/L (maximum observed (5.21 mg/L) x TSD multiplier (2.6))
C_s = 0.182 mg/L
Calculated Result:
C_r = 0.59 mg/L TP

Using the above calculated critical effluent concentration (C_d) and receiving water concentration (C_s), average daily design flow (Q_d) and low flow rate based on 100% of the seasonal 14Q5 (Q_s) in *Equation 1*, the resulting downstream pollutant concentration (C_r) is calculated as 0.59 mg/L. C_r is greater than the applicable water quality standard, therefore DEQ finds that the WWTF has RP to exceed the TP standard and a WQBEL is required (see **Attachment A**). Seasonal monthly effluent monitoring will be required in the proposed permit (see section VI of this Fact Sheet).

A WLA (C_{WLA}) was calculated using the following values in *Equation 2* so that the discharge does not cause or contribute to an exceedance of applicable water quality standard (base numeric nutrient standard) under critical conditions. Because the critical receiving water concentration (C_s) is greater than the water quality standard, the WLA is set at the water quality standard (0.030 mg/L) at the end-of-pipe.

Given:
C_s = 0.182 mg/L
C_r = 0.030 mg/L (water quality standard)
Calculated Result:
C_{WLA} = 0.030 mg/L TP

The WLA is then translated into an AML based on the end-of-pipe WLA equal to the water quality standard. Total nutrient WQBELs do not require a MDL. The AML is also set at 0.030 mg/L TP. The calculation of the proposed TP limit of 0.030 mg/L AML based on TSD method is presented in **Attachment B**.

3. Toxic Pollutants

Arsenic: The aquatic life chronic and acute standards for arsenic (As) are 150 µg/L and 340 µg/L, respectively. The human health standard for arsenic in surface water is 10 µg/L. Sample results indicate a maximum effluent concentration below the analytical method

detection limit of 5µg/L of arsenic was detected for one sample taken October 16, 2009. The critical instream concentration calculated using TSD methods is greater than the HHS of 10 µg/L, indicating there is no assimilative capacity. A review of the facility's source water finds that public water supply (PWS) wells are unlikely to contribute arsenic to the WWTF in any amount that would affect water quality. Data were reviewed from two PWS wells with datasets of 11 and 6 samples, respectively, taken from February, 2011 through July, 2016. Both the 75th percentile and the 95% upper confidence limit are less than 10 µg/L for both wells. There are no process-based contributions of arsenic to the effluent, and lagoon cells are lined to prevent groundwater infiltration. Available information indicates the WWTF is unlikely to exceed the HHS of 10 µg/L.

Quarterly effluent monitoring for arsenic will be required to ensure the WWTF meets the intent of the 2014 TMDL.

Whole Effluent Toxicity (WET) – The proposed facility is a small POTW discharging less than 0.1 mgd. There are no identified industrial contributions as listed in 40 CFR 122 Appendix A, and the facility will not receive discharge from significant industrial users subject to pretreatment requirements. WET testing is not required.

Table 7: Outfall 001 Proposed WQBELs(1)

Parameter	Units	Average Monthly	Average Weekly	Maximum Daily
Escherichia coli (E. coli) Bacteria, April- October	cfu/100 mL	126(2)	252	--
Escherichia coli (E. coli) Bacteria, November - March	cfu/100 mL	630(2)	1,260	--
Ammonia, total as N	mg/L	3.9	--	7.9
	lb/day	5.3	--	--
Total Nitrogen as N(3)	mg/L	0.300	--	--
	lb/day	0.400	--	--
Total Phosphorus as P(3)	mg/L	0.030	--	--
	lb/day	0.040	--	--

Footnotes: cfu = colony forming unit.

(1) See Definition section at end of permit for explanation of terms.
(2) Report Geometric Mean if more than one sample is collected in the reporting period.
(3) Effective July 1 through September 30.

V. Final Effluent Limits

Effluent limitations or conditions in reissued permits must be at least as stringent as those in the existing permit, with certain exceptions. Federal regulations require permits to contain the more stringent TBEL or WQBEL limitation applicable to an individual pollutant. DEQ considered the proposed permit limits to ensure that they were as stringent as previous limits, or met the anti-backsliding requirements.

Beginning on the effective date and lasting through the term of the permit, the discharge from Outfall 001 shall, at a minimum, meet the effluent limits presented in **Table 8**:

Table 8: Proposed Final Effluent Limits

Parameter	Units	Effluent Limitations[1]			
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Instantaneous Maximum Limit
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	--	--
	lbs/day	40	60	--	--
	% removal	85	--	--	--
Total Suspended Solids (TSS)	mg/L	45	65	--	--
	lbs/day	60	87	--	--
	% removal	65	--	--	--
pH[2]	s.u.	--	--	--	6.0 – 9.0
Escherichia coli (E. coli) Bacteria –summer [3][5]	cfu/100ml	126	252	--	--
Escherichia coli (E. coli) Bacteria –winter[4][5]	cfu/100ml	630	1,260	--	--
Ammonia, total as N	mg/L	3.9	--	7.9	--
Total Nitrogen as N[6]	mg/L	0.300	--	--	--
	lb/day	0.400	--	--	--
Total Phosphorus as P[6]	mg/L	0.030	--	--	--
	lb/day	0.040	--	--	--

Footnotes: cfu = colony forming unit.

(1) See definitions in the permit.
(2) Effluent pH shall remain between 6.0 and 9.0 (instantaneous minima and maxima). For compliance purposes, any single analysis and/or measurement beyond this limitation shall be considered a violation of the conditions of this permit.
(3) This limit applies from April 1 through October 31.
(4) This limit applies from November 1 through March 31.
(5) The geometric mean of the samples taken for the sample period (monthly or weekly) may not exceed these values.
(6) Effective July 1 through September 30.

There shall be no discharge of floating solids or visible foam in other than trace amounts. There shall be no discharge which causes visible oil sheen in the receiving stream [ARM 17.30.637(1)(b)].

VI. Monitoring Requirements

Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136 and the analysis must meet any RRVs listed in Circular DEQ-7 unless otherwise specified.

Monitoring location for influent must be after the last sewer connection and before discharge into the treatment facility. Monitoring of influent is required only during periods of discharge into Big Pipestone Creek other than as required under Part VII Special Conditions.

Monitoring of the effluent must be representative of the volume and nature of the discharge. During discharge events, Monitoring and effluent limits apply at the sample tap after UV treatment, prior to discharge to Big Pipestone Creek. If the facility does have a controlled discharge event, monitoring is required at the time of discharge. Effluent and influent monitoring requirements are presented in **Table 9**. Monitoring during land application is discussed below in Part VII.

Influent and effluent monitoring results must be reported within a Discharge Monitoring Report (DMR). Monitoring results must be submitted electronically (NetDMR web-based application) no later than the 28th day of the month following the end of the monitoring period. If no discharge into Big Pipestone Creek is observed during the reporting period, "no discharge" shall be reported on the Net DMRs.

A. Influent/Effluent Monitoring

Table 9: Outfall 001 Monitoring and Reporting Requirements

Parameter	Units	Sample Location	Minimum Sample Frequency(1)	Sample Type(2)	Reporting Requirements	Required Reporting Value
Effluent Flow	mgd	Effluent	3/Week	Instantaneous	Weekly Average	NA
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	Influent	Monthly	Grab	Monthly Average	NA
	mg/L	Effluent	Weekly	Composite	Weekly Maximum Monthly Average	
	lb/day	NA	Weekly	Calculated	Weekly Maximum Monthly Average	
BOD_5 Percent Removal	%	NA	Monthly	Calculated	Monthly Average	
Total Suspended Solids (TSS)	mg/L	Influent	Monthly	Grab	Monthly Average	NA
	mg/L	Effluent	Weekly	Composite	Weekly Maximum Monthly Average	
	lb/day	NA	Weekly	Calculated	Weekly Maximum Monthly Average	
TSS Percent Removal(3)	%	NA	Monthly	Calculated	Monthly Average	
pH	s.u.	Effluent	Weekly	Instantaneous	Monthly Maximum Monthly Minimum	NA
Escherichia coli (E. coli) Bacteria(4)	cfu/ 100 ml	Effluent	3/Week	Grab	Monthly Average Weekly Average	NA

Table 9: Outfall 001 Monitoring and Reporting Requirements

Parameter	Units	Sample Location	Minimum Sample Frequency[(1)]	Sample Type[(2)]	Reporting Requirements	Required Reporting Value
Oil and Grease[(5)]	mg/L	Effluent	Weekly	Grab	Monthly Average Weekly Average	NA
Ammonia, total as N	mg/L	Effluent	Monthly	Composite	Monthly Average Weekly Average	0.070
Nitrate + Nitrite, as N	mg/L	Effluent	Monthly[(6)]	Composite	Monthly Average Weekly Average	0.05
Total Kjeldahl Nitrogen, as N	mg/L	Effluent	Monthly[(6)(7)]	Composite	Monthly Average Weekly Average	0.225
Total Nitrogen as N[(6)]	mg/L	Effluent	Monthly[(7)]	Calculated/ Composite	Monthly Average Weekly Average	NA
	lb/day	NA	Monthly	Calculated	Monthly Average Weekly Average	
Total Phosphorus as P	mg/L	Effluent	Monthly[(7)]	Calculated/ Composite	Monthly Average Weekly Average	0.01
	lb/day	NA	Monthly	Calculated	Monthly Average Weekly Average	NA
Arsenic, total recoverable[(8)]	µg/L	Effluent	Quarterly	Composite	Monthly Average	1

Footnotes: NA = Not applicable. cfu = colony forming unit.

(1) Minimum sample frequency applies to periods of discharge to Big Pipestone Creek.
(2) See Definition section at end of permit for explanation of terms.
(3) Percent (%) removal shall be calculated using the monthly average values.
(4) Report Geometric Mean if more than one sample is collected in the reporting period.
(5) Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM).
(6) The total nitrogen concentration calculated as the sum of total Kjeldahl nitrogen plus nitrate + nitrite
(7) Nutrient monitoring only required from July 1 – September 30.
(8) Metals shall be analyzed as total recoverable; use EPA method (Section) 4.1.4 [EPA 600/4-79-020, March 1983] or equivalent.

B. Instream Monitoring

Instream monitoring will be required in the proposed permit as found in **Table 10**. Monitoring must take place at a consistent location upstream and outside the influence of Outfall 001 with the sample type, frequency, and RRV as identified below. Instream ambient water quality monitoring is required only in the last two years of the permit cycle.

Instream monitoring results must be reported within a Discharge Monitoring Report (DMR). Monitoring results must be submitted electronically (NetDMR web-based application) no later than the 28th day of the month following the end of the monitoring period.

Table 10. Big Pipestone Creek Ambient Monitoring and Reporting Requirements(1)

Location	Parameter	Units	Sample Frequency	Sample Type(2)	Required Reporting Value(3)
Big Pipestone Creek: Upstream of discharge at Outfall 001 and downstream of any tributary or irrigation return flow.	pH	s.u.	Quarterly	Instantaneous	NA
	Temperature	°C	Quarterly	Instantaneous	NA
	Ammonia, total as N	mg/L	Quarterly	Grab	0.070
	Nitrate + Nitrite, as N	mg/L	Quarterly	Grab	0.020
	Nitrate + Nitrite, as N – summer(4)(5)	mg/L	Monthly	Grab	
	Total Kjeldahl Nitrogen, as N(4)(5)	mg/L	Monthly	Grab	0.225
	Total Nitrogen as N(4)(5)	mg/L	Monthly	Grab/Calculated	0.070(6)
	Total Phosphorus as P(5)	mg/L	Monthly	Grab	0.003
	Arsenic, total recoverable	µg/L	Quarterly	Grab	1

Footnote: NA = Not applicable.

(1) Ambient water quality monitoring is required only in the third and fourth years of the permit cycle (2019 and 2020).
(2) See Definition section at end of permit for explanation of terms.
(3) See Circular DEQ-7 or DEQ-12A for more information on RRVs. Analysis must achieve these, or lower, reporting limits.
(4) The total nitrogen concentration may be analyzed by either persulfate digestion, or by the sum of total Kjeldahl nitrogen plus nitrate+nitrite; If persulfate digestion is used, the Permittee is not required to conduct the weekly summer sampling for nitrate+nitrite or total Kjeldahl nitrogen .
(5) Nutrient monitoring only required from July 1 – September 30.
(6) The total nitrogen RRV of 0.070 mg/L applies only to total nitrogen determined by persulfate digestion.

VII. Special Conditions

Land Application of Effluent Monitoring

Semiannual effluent monitoring is required for the purpose of effluent characterization, and occurs during periods of land application of effluent in lieu of discharge to Big Pipestone Creek. The monitoring location for effluent during land application of effluent is at a sample tap installed in the pivot system at the pressure gage location. Land application of effluent monitoring requirements are presented in **Table 11**. Land application of effluent monitoring results must be reported within an annual report. Whitehall is required to submit the results by no later than January 28th of the year following the monitoring period.

Table 11: Land Application of Effluent Monitoring and Reporting Requirements

Parameter	Units	Sample Location	Minimum Sample Frequency(1)	Sample Type(2)	Reporting Requirements	Required Reporting Value
5-Day Biochemical Oxygen Demand (BOD_5)	mg/L	Influent	Semiannually	Grab	Monthly Average	NA
	mg/L	Effluent	Semiannually	Composite	Monthly Average	
Total Suspended Solids (TSS)	mg/L	Influent	Semiannually	Grab	Monthly Average	NA
	mg/L	Effluent	Semiannually	Composite	Monthly Average	
pH	s.u.	Effluent	Semiannually	Instantaneous	Monthly Maximum Monthly Minimum	NA
Escherichia coli (E. coli) Bacteria(3)	cfu/ 100 ml	Effluent	Semiannually	Grab	Monthly Average	NA
Oil and Grease(4)	mg/L	Effluent	Semiannually	Grab	Max Daily	NA
Ammonia, total as N	mg/L	Effluent	Semiannually	Composite	Monthly Average	0.070
Nitrate + Nitrite, as N	mg/L	Effluent	Monthly(5)(6)	Composite	Monthly Average	0.05
Total Kjeldahl Nitrogen, as N	mg/L	Effluent	Monthly(5)(6)	Composite	Monthly Average	0.225
Total Nitrogen as N(5)	mg/L	NA	Monthly(6)	Calculated/ Composite	Monthly Average	NA
Total Phosphorus as P(6)	mg/L	Effluent	Monthly	Composite	Monthly Average	0.01
Arsenic, total recoverable	µg/L	Effluent	Quarterly	Composite	Monthly Average	1

Footnotes: NA = Not applicable. cfu = colony forming unit.

(1) Minimum sample frequency applies to periods of land application of effluent in lieu of discharge to Big Pipestone Creek. If Whitehall WWTF discharges effluent to Big Pipestone Creek, monitoring must occur as described in Part VI. Monitoring Requirements.
(2) See Definition section at end of permit for explanation of terms.
(3) Report Geometric Mean if more than one sample is collected in the reporting period.
(4) Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM).
(5) The total nitrogen concentration is calculated as the sum of total Kjeldahl nitrogen plus nitrate + nitrite.
(6) Nutrient monitoring only required from July 1 – September 30.

VIII. Public Participation

a. Public Notice

In accordance with ARM 17.30.1372, DEQ issued Public Notice No. MT-17-1 dated January 3, 2017. The public notice states that a tentative decision has been made to issue an MPDES permit to the Permittee and that a draft permit, fact sheet and environmental assessment (EA) have been prepared. Public comments are invited any time prior to the close of the business on February 2, 2017. Comments may be directed to:

Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620

or

DEQWPBPublicComments@mt.gov

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments and issue a final decision within sixty days of the close of the public comment period or as soon as possible thereafter.

All persons, including the applicant, who believe any condition of a draft permit is inappropriate or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing) under ARM 17.30.1372.

b. Notification of Interested Parties

Copies of the public notice were mailed to the discharger, state and federal agencies and interested persons who have expressed an interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this permit. In addition to mailing the public notice, a copy of the notice and applicable draft permit, fact sheet and EA were posted on DEQ’s website for 30 days.

Any person interested in being placed on the mailing list for information regarding this MPDES permit should contact DEQ, reference this facility, and provide a name, address, and email address.

c. Public Hearing

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing (ARM 17.30.1373).

d. Permit Appeal

After the close of the public comment period DEQ will issue a final permit decision. A final permit decision means a final decision to issue, deny, modify, revoke and reissue, or, terminate a permit. A permit decision is effective 30 days after the date of issuance unless a later date is specified in the decision, a stay is granted pursuant to ARM 17.30.1379, or the applicant files an appeal pursuant to 75-5-403, MCA.

The Applicant may file an appeal within 30 days of DEQ's action to the following address:

Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
PO Box 200901
Helena, Montana 59620-0901

e. Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at 406-444-3080.

IX. Information Sources

Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
- Subchapter 2 – Permit Application, Degradation Authorization, and Annual Fees.
- Subchapter 5 – Mixing Zones in Surface and Ground Water.
- Subchapter 6 – Surface Water Quality Standards and Procedures.
- Subchapter 7 – Nondegradation of Water Quality.
- Subchapter 12 – MPDES-Effluent Limitations and Standards, Standards of Performance, and Treatment Requirements.
- Subchapter 13 – MPDES Permits.

CWAIC: Clean Water Act Information Center, Montana DEQ, http://deq.mt.gov/Water/WQPB/cwaic (accessed 2016)

Great West Engineering. 2006. *Preliminary Engineering Report (PER) Wastewater System Improvements prepared for the Town of Whitehall* (March 2006)

Great West Engineering. 2011. *Final Whitehall Wastewater Improvements Design Memorandum* (July 2011)

Great West Engineering. 2011. *Town of Whitehall, Montana Land Application Evaluation and Irrigation Plan for Treated Municipal Wastewater Effluent* (February 2011)

Great West Engineering. 2014. *Town of Whitehall Wastewater System Improvements O&M Manual*

Montana Code Annotated (MCA), Title 75-5-101 *et seq*., "Montana Water Quality Act"

Montana DEQ. 2014. *Final Water Quality Integrated Report* (May 2014)

Montana DEQ. 2009. *Upper Jefferson River Tributary Sediment TMDLs and Framework Water Quality Improvement Plan.* Helena, MT: Montana Dept. of Environmental Quality.

Montana DEQ. 2014. *Jefferson River Metals Project Area TMDLs and Water Quality Improvement Plan*. Helena, MT: Montana Dept. of Environmental Quality.

MFISH: Montana Fisheries Information System, Montana Fish, Wildlife, and Parks, http://fwp.mt.gov/fishing/mFish/ (accessed 2016)

Montana Department of Environmental Quality. Circular DEQ-7: Montana Numeric Water Quality Standards (October 2012)

Montana Department of Environmental Quality. Circular DEQ-12A: Montana Base Numeric Nutrient Standards (July 2014)

Montana Department of Environmental Quality. Circular DEQ-12B: Nutrient Standards Variance (July 2014)

Montana Department of Fish Wildlife and Parks. 2001. *Spawning Times of Montana Fishes* (March 2001)

Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0020133
a. Administrative Record
b. Renewal Application Forms DEQ-1 and EPA Form 2A, 2014
c. Additional application information, 2016

Montana DEQ. 2016. Lagoon O&M Report, Town of Whitehall Wastewater Treatment Facility (August, 2016)

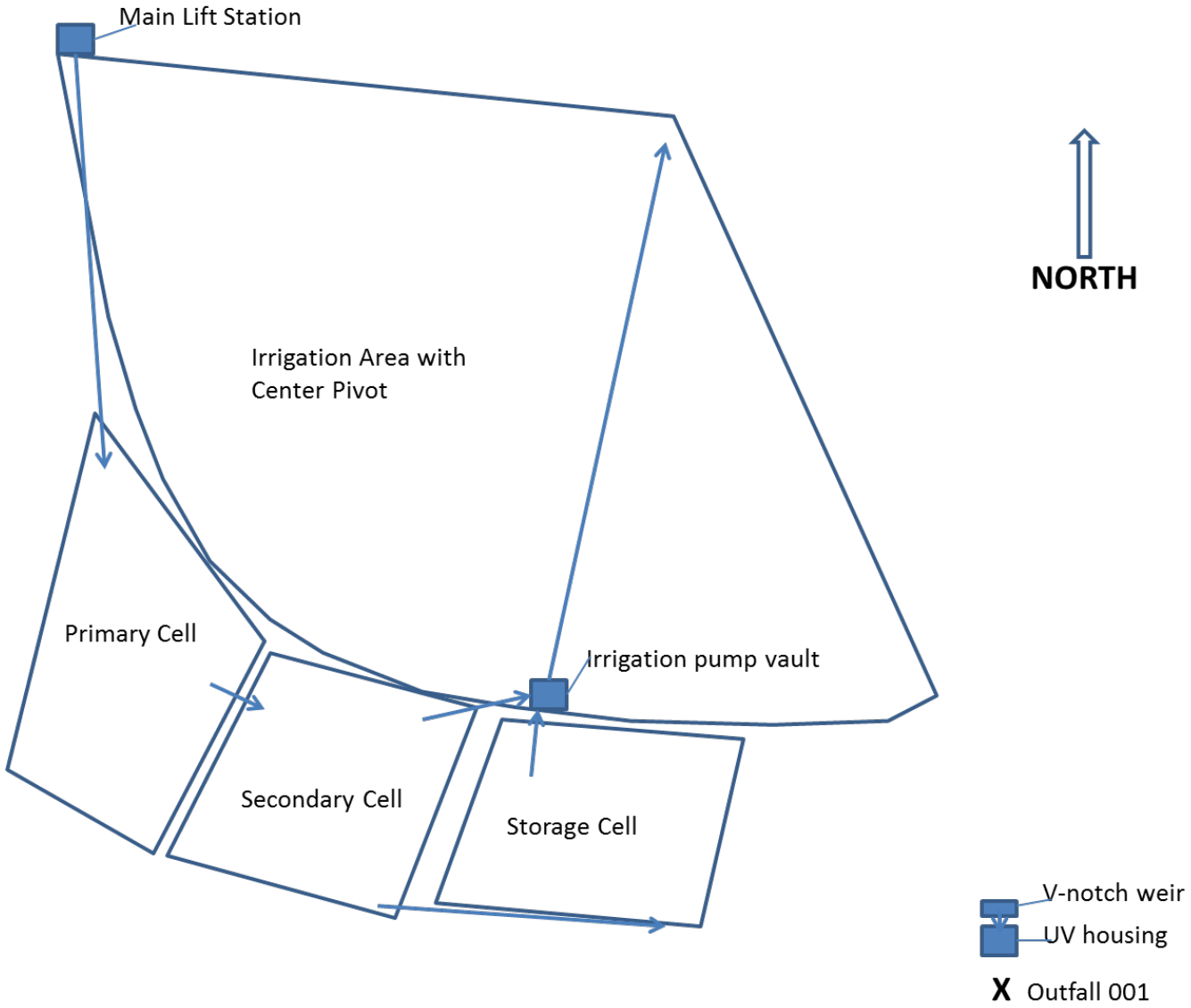
S & A Engineers .1988. *Wastewater Treatment Facility Operation and Maintenance Manual, Town of Whitehall, Montana* (July 1988)

Town of Whitehall Wastewater Improvements Schedule Summary (February 2011)

Town of Whitehall Administrative Order on Consent, Docket No. WQ-10-24 (January 2011)

Fact Sheet prepared: December 2016 by Emilie Erich Hoffman

Figure 1. Diagram of Whitehall WWTF Lagoon System with Land Application of Effluent



Attachment A: Whitehall WWTP Reasonable Potential Analysis (December 2016)

			Oil and Grease	Ammonia (Chronic)	N+N (HHS)	Nitrogen, total (TN) Seasonal	Phosphorus, total (TP) Seasonal
Flow							
critical stream flow	7Q10 or seasonal 14Q5	mgd	3.6	3.6	3.6	5.0	5.0
% of critical stream flow for dilution	as decimal	%	0	0.25	0.25	1.00	1.00
Q_s	instream flow available for dilution Q_s = (critical stream flow for dilution)*(% of critical stream flow provided)	**mgd**	**0.00**	**0.90**	**0.90**	**5.00**	**5.00**
Q_d	critical effluent flow (avg. daily design flow)	**mgd**	**0.16**	**0.16**	**0.16**	**0.16**	**0.16**
Q_r	downstream flow ($Q_s + Q_d$)	mgd	0.16	1.06	1.06	5.16	5.16
Concentrations							
C_{max}	maximum effluent concentration for POR (from application or DMR data)	mg/L	**5.6**	**24.7**	**1.26**	**22.0**	**5.21**
n	number of samples in effluent data set		10	15	14	4	4
CV	0.6 if n < 10 calculated as $\sigma_{effluent}/\mu_{effluent}$ if n ≥ 10		0.6	0.557	1.24	0.6	0.6
P_n	%tile for n samples at 95% confidence level		0.74	0.82	0.81	0.47	0.47
Z_{Pn}	Z-score for P_n		0.65	0.91	0.87	-0.075	-0.068
TSD	calculated TSD multiplier (should be close to Table 3-2 value)		1.7	1.5	2.1	2.6	2.6
C_d	critical effluent concentration - 95%tile (=max. effluent concentration * TSD multiplier)	**mg/L**	**9.7**	**37**	**2.7**	**57**	**13**
C_s	critical instream concentration (75%tile if n<=30, 95% UCL if n>30)	**mg/L**	**0.00**	**0.40**	**0.24**	**1.70**	**0.182**
C_r	**resulting or downstream pollutant concentration** $C_r = (C_dQ_d + C_sQ_s)/(Q_d+Q_s)$	**mg/L**	**9.7**	**6**	**0.61**	**3.4**	**0.59**
WQS	**water quality standard**	**mg/L**	**10**	**2.08**	**10**	**0.300**	**0.030**
Reasonable Potential			**no**	**yes**	**no**	**yes**	**yes**

Attachment B: Whitehall WWTP WQBELs Development (December 2016)

			Ammonia		Nitrogen, total (TN)	Phosphorus, total (TP)
			acute	chronic	seasonal	seasonal
critical stream flow	7Q10 or seasonal 14Q5	mgd	3.6		5.0	5.0
% of critical stream flow for dilution			2.5	25	100	100
Q_s	instream flow available for dilution	mgd	0.09	0.90	5.0	5.0
Q_d	design flow (POTW)	mgd	0.16		0.16	0.16
Q_r	downstream flow, $Q_r = Q_s + Q_d$	mgd	0.25	1.06	5.16	5.16
C_r	water quality standard	mg/L	5.21	2.08	0.300	0.030
C_s	critical instream concentration: 75^{th} percentile if n≤30					
	95% upper confidence limit if n>30	mg/L	0.40		1.70	0.182
C_d or WLA	$C_d = [(Q_rC_r) - (Q_sC_s)]/Q_d$					
	WLA = WQS if C_s > WQS	mg/L	7.9	11.5	0.300	0.030
number of effluent samples per month	must use ≥ 4 for calculations		4		4	4
CV of effluent dataset	0.6 if n < 10					
	calculated as $\sigma_{effluent}/\mu_{effluent}$ if n ≥ 10		0.557		0.6	0.6
LTA_a , LTA_c	acute, chronic long term average (99^{th} percentile)	mg/L	2.54	9.0	0.096	0.010
Most conservative LTA	minimum of LTA_a , LTA_c	mg/L	2.54		NA	NA
Maximum Daily Limit	99^{th} percentile MDL = WQS if calculated 99^{th} percentile < WQS	mg/L	**7.9**		**NA**	**NA**
Average Monthly Limit	95^{th} percentile MDL = WQS if calculated 95^{th} percentile < WQS	mg/L		**3.9**	**0.300**	**0.030**